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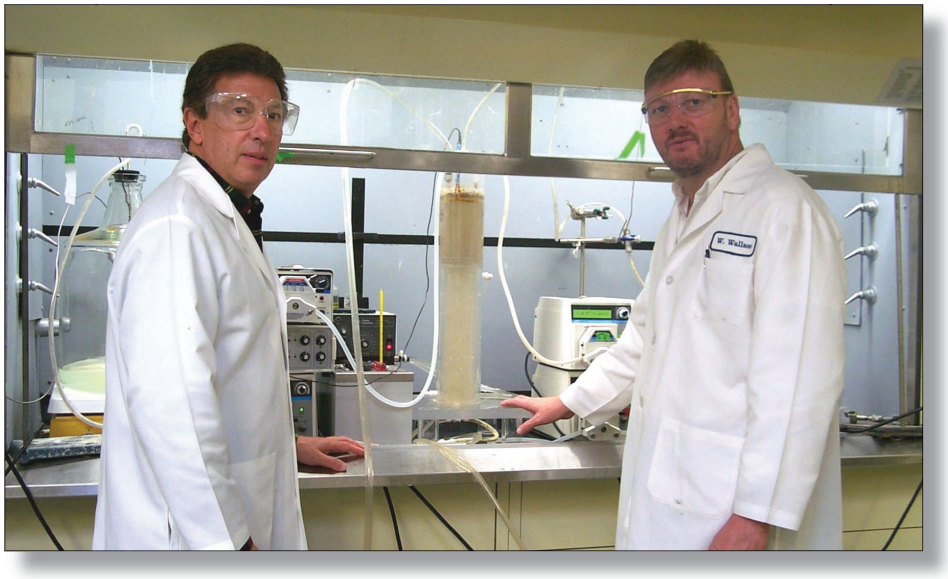
Science and Technology for Tomorrow's Air and Space Force

Success Story

RESEARCHERS EXPLORE MICROBIAL HYDROGEN PRODUCTION AS KEY TO ALTERNATIVE ENERGY SOURCE AT BARE BASE FACILITIES



When successful, Materials and Manufacturing Directorate researchers will have demonstrated that hydrogen production from bare base waste streams is a feasible alternative source of energy for fuel cells. Fuel cells driven by hydrogen will lower diesel fuel consumption and will lessen the logistical burden at the bare base.

The hydrogen generation from waste will be an environmentally friendly process, reducing noise and air pollution created by current diesel energy generators and reducing the removal and treatment of sewage waste by the nation hosting the base. Success of the project will expand opportunities to develop the process as an alternative energy source for other industrial operations.

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Accomplishment

Directorate researchers are developing a biological method of producing hydrogen from waste streams created by base dining halls, kitchens, latrines, hospitals, laundry facilities, and showers at bare base facilities. The directorate will develop a two-reactor system to produce a clean source of hydrogen for fuel cells while reducing waste disposal and treatment needs, in addition to the logistical and pollution burdens associated with using current diesel energy generators for energy production.

Background

Bare base facilities have as many as 1,100 personnel who live in temporary housing. Their mission often requires the base to function for several years with the host nation providing little or no services. Currently, mission-essential power (MEP)-12 diesel generators produce the electrical power needs of the base. The MEP-12 generators require 4,000 gallons of diesel fuel per day, which require transportation to and storage at the facility.

The personnel at bare base facilities produce various waste streams from dining hall waste, sewage sludge, and wastewater. Researchers from the directorate's Weapons Systems Logistics Branch initiated a project that may make it possible to exploit waste streams to produce hydrogen needed to supplement base energy needs. The possibility of using hydrogen as an alternative fuel is an exciting option due to its high conversion efficiency and non-polluting nature.

Though hydrogen is the most abundant element on earth, it is bound to other elements and must be separated from the other elements before it can be used in energy generation. Using sunlight as an energy source, specific enzymes contained in microorganisms can produce hydrogen from waste materials, providing a seemingly inexhaustible source of material for hydrogen production. Hydrogen production from waste materials will encourage additional waste recycling and waste management in bare base operations.

Materials and Manufacturing
Emerging Technologies

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-ML-08)